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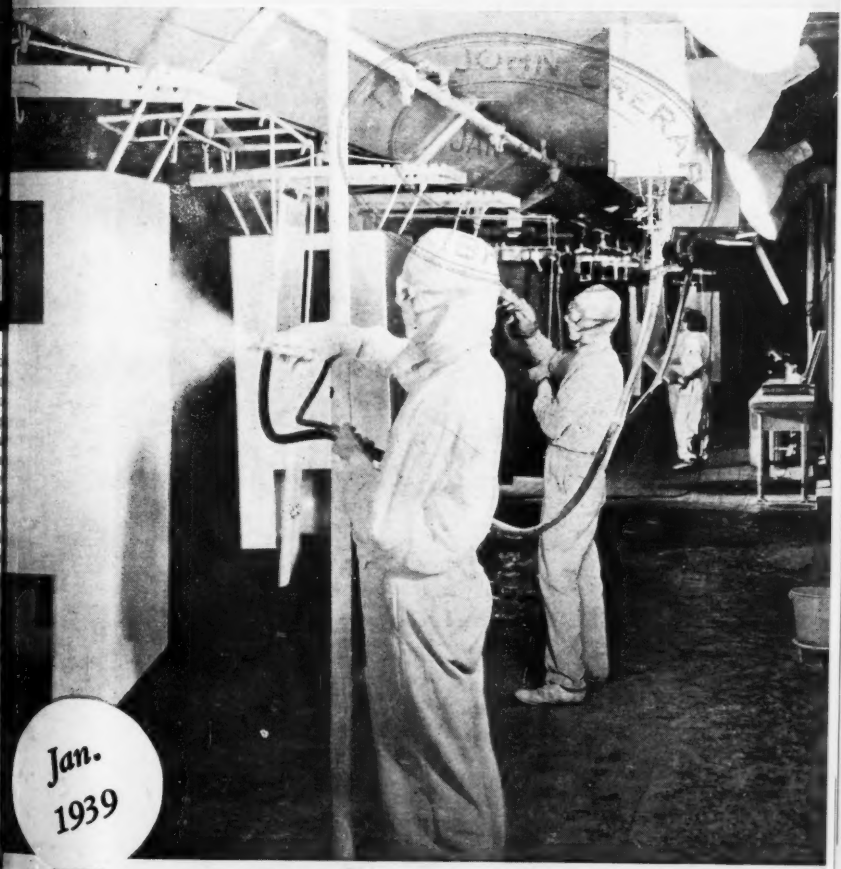
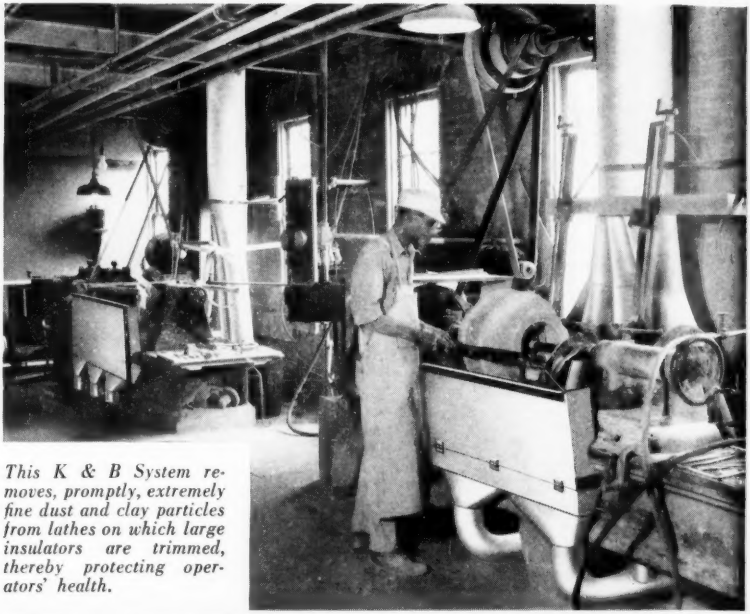
Occupational HAZARDS & SAFETY



Jan. 1939

There's Profit in Prevention



This K & B System removes, promptly, extremely fine dust and clay particles from lathes on which large insulators are trimmed, thereby protecting operators' health.

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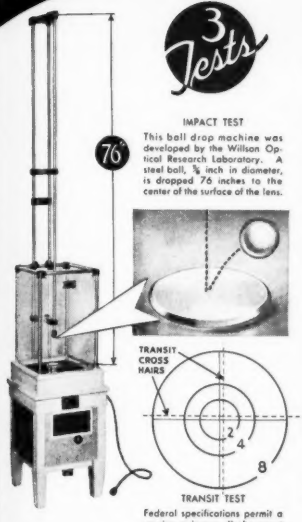
Specify DOUBLE WILLSON FLAT Super-TOUGH Lenses for FREEDOM FROM DISTORTION RESISTANCE TO IMPACT··


3 Tests
76"
IMPACT TEST
This ball drop machine was developed by the Willson Optical Research Laboratory. A steel ball, ⅜ inch in diameter, is dropped 76 inches to the center of the surface of the lens.
TRANSIT CROSS HAIRS
2
4
8
TRANSIT TEST
Federal specifications permit a maximum image displacement of 4 minutes of arc. Super-Tough Lenses displace the image less than 2 minutes of arc.

Proper Heat Treatment Results in Uniform Stress Distribution—Left above: Polarized Light Pattern showing uniform stress distribution over entire lens surface. Every Super-Tough Lens is subjected to this test. Right above: This lens has been subjected to sufficient impact to break it. Note even distribution of fracture.

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Because they are *Uniformly* "heat-treated," Willson *Flat* Super-Tough Lenses provide maximum protection against Industrial Hazards, whether chips of steel, splashes of molten metal, chemicals or dust.

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All Willson *Flat* Super-Tough Lenses are *individually tested* before shipment and meet requirements which are far more severe than Federal Specifications.

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Identify them by these trademarks stamped on every genuine Willson Super-Tough Lens—

W Clear Super-Tough

Wn Willsonite Super-Tough (Shades A, B, and C)

Complete Willson Catalogue on Request

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More than 40 types for Dusts, Fumes, Gases, Smoke, Sprays

Make Pulmosan your respirator headquarters. Get just the type respirator you need, from the most complete line on the market. And get the high safety, comfort and serviceability that go with each Pulmosan Respirator.

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SAFETY EQUIPMENT CORP.

Dept. OH

176 Johnson St., Brooklyn, N.Y.

INDUSTRIAL production up 23 points in the last six months . . . factory employment up 24 points . . . factory payrolls up 13 points . . . building contracts awarded up 29 points . . . steel production 50% above the midsummer low . . . automobile output, steel, cement, and glass production well ahead of 1938 . . . activity in the heavy goods industries continues upward trend.

These business indicators appearing in the financial and industrial sections of our daily newspapers are factual evidence of improved industrial conditions. They reflect the forward movement of industry. They tell a factual story of the better spirit and morale existing in American industry. Last year at this same time industry was sliding. Today industry is looking up and moving forward. Regardless of what factors are behind this improved situation, it is a fact. We join with business and industry in greeting such favorable news. At the same time, however, we consider it our duty to post some warning signs along the highway leading to better industrial conditions.

Experience and surveys show that a rise in industrial activity is accompanied by an increase in industrial accidents and occupational diseases. This is stated as a fact. We do not believe that such a situation needs to exist. But if American industry is to reverse the past results, it will be necessary to take greater precautions and institute still greater safeguards in operations and processes. Many a "no accident" record has been ended when production is speeded up, or when a large group of new employees are added to the payrolls. Some say that this is

only a natural occurrence and cannot be avoided. We do not agree with this school of thought. Industry can and must face the realities of actual conditions and reap the full benefits which should rightly accrue to them from increased operations in their plant.

We believe that increased industrial activity does demand that plants take certain definite precautions when increased production schedules must be maintained. During a period of less than normal activity, various machinery equipment and tools stand idle. Therefore, when this equipment is put into use after a period of idleness, it should be inspected carefully to see that all parts are in proper working order, that guards are in good condition and functioning properly. Any repairs should be done before any operations at all are started. It may be that new equipment is needed to meet the increase in orders. Safeguards should be taken to see that this new equipment presents no unusual hazards to the operator, and that all possible sources of injury are adequately guarded. The employment of new workers, or former employees who have been laid off for a period of time, demands that they be impressed with the necessity of working safely and properly instructed in the use of equipment and machinery which presents a potential hazard. Any new materials and processes involved in the expansion of operations should be studied for possible health hazards and proper safeguards instituted. This includes providing exhaust and dust and fume control systems; educating the employee in handling the materials; and in furnishing him the adequate personal protective devices and clothing. Workrooms should be cleaned thoroughly and adequate sanitary facilities installed and maintained properly.

The time to bolster weak spots and take control and preventive measures is at the start of increased production schedules. This will avoid any loss of time on the job, the slowing down of production, injuries to workmen's health and the loss of thousands of dollars. FOR THERE IS PROFIT IN PREVENTION.

[*Continued on page 7*]

Prevent DUST Loss with SLY Filters

You can easily prevent loss in efficiency of your workmen and damage to products and machinery caused by dust, by using Sly Dust Filters.

By giving you greater filtering capacity per cubic foot of space, Sly Dust Filters give you greater value. By their superior cleaning mechanism for the cloth bags, they give you *better* dust collection.

All about the many savings in dust collection. Ask for Bulletin 0-90.

SEND FOR THIS Free BOOK

THE W. W. SLY MANUFACTURING CO.
Dust Control Equipment for Every Industrial Purpose
4751 Train Avenue Cleveland, Ohio
Branch Offices In Principal Cities

Useful Free Literature

The publications briefly described in this service department are prepared by manufacturers' technical experts. The data they contain on equipment, supplies and prevention methods applies to varied phases of occupational hazard problems.

067—DUST CONTROL

The third in the series of "Dust Hog" mailings has been released by the Pangborn Corporation. This illustrated folder describes damage caused by dusts and suggests steps to take to eliminate dust deterioration and destruction.

068—LIGHTING EQUIPMENT

A six page folder, illustrating and giving specifications and data of the Curtisstrip, and for flourescent lamp fittings. Issued by the Curtis Lighting Co.

069—AIR LINE RESPIRATOR

Two page folder of Mine Safety Appliances Co., illustrating and describing the M.S.A. Bureau of Mines Approved Air Line Hose Mask, and giving details of construction and operation.

070—CLEANLINESS

Reprint of address "Try Cleanliness First," by W. R. Redden, Director of First Aid, New York Chapter, American Red Cross. Offered by the Sugar Beet Products Corp.

071—SAFETY SLINGS

The Broderick & Bascom Rope Co. announces the publication of a booklet illustrating and describing safety slings. The leaflet contains tables showing comparative strength of plaited slings, regular wire rope slings, chain slings and other information.

072—CLEANING MATERIALS

A new 12-page booklet entitled "Greater Industrial Safety" has been released by Oakite Products, Inc. This booklet describes modern cleaning methods and materials and their relation to protection against occupational disease hazards and fire hazards.

073—RESEARCH STUDIES

The Crane Co. has issued an attractive 48-page booklet describing the research activities of that company in the fields of metallurgy, ceramics, radiography, welding and other industrial products. Profusely illustrated.

074—SPEED HEATERS

Twenty-four page catalog of the B. F. Sturtevant Co., illustrating and describing heaters and heating systems. Contains tables on constants, capacities, and coefficients. Also, installation information.

075—CORRECT POSTURE

How proper seating increases efficiency, suggestions for determining correct posture, and illustrations and descriptions of various types of industrial chairs and stools are included in a 24-page booklet of the Royal Metal Manufacturing Co.

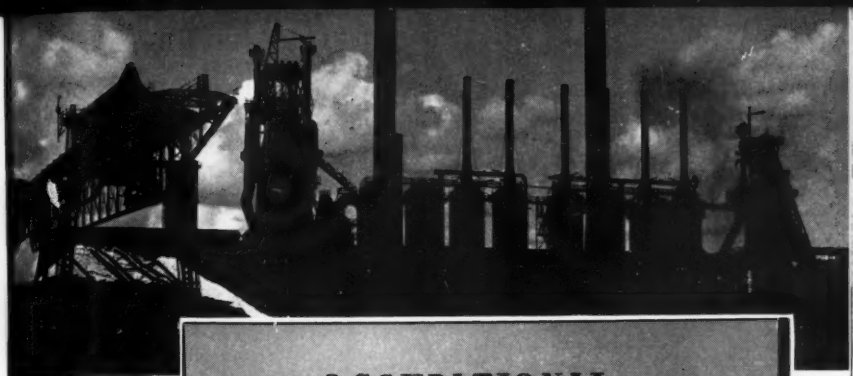
076—HEAVY DUTY FLOOR SURFACING

Six-page folder of the William F. Klemp Co. describing material to be used in surfacing old or new floors for heavy duty wear.

077—CABLE STRIPPERS

Operating details, descriptions and illustrations of hand, foot-operated and motor-driven wire and cable strippers are featured

[*Continued on page 6*]



OCCUPATIONAL Hazards AND Safety

CONTENTS FOR JANUARY

	Page
The Safety Valve	2
Useful Free Literature	4
Where There's Casting, There's Foundry Dust	8
Dermatoses Attacks on Balance Sheets	13
Coping With Fumes	16
This Month in Washington	20
Boomerangs	23
Vacuum Cleaning	26
Right off the Docket	29
Selling Safety	31
New Products in the Field	34
"As Maine Goes"	38
Questions and Answers	39

Front Cover: spray gun enamel painting of air-conditioning cabinets. Exhaust system and protective clothing used. Photo courtesy Westinghouse Electric & Mfg. Co.

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[illegible] Hexter, President
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R. C. Walker, Editor
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G. B. Fink, Production Mgr.
Alfred G. Reuter, Representative
Harold Steffers, Representative

in a folder of the Ideal Commutator Dresser Co. This folder also lists and illustrates a line of solderless wire connections and other equipment.

078—TWO-ROOM EXHAUST

A folder of Propellair, Inc. illustrates and describes the operation of a single exhaust fan exhausting from two different rooms on two different floors.

079—VACUUM CLEANING

A new folder of the U. S. Hoffman Machinery Corp. describes the control of dust through the use of heavy-duty portable vacuum cleaners. Specifications and illustrations of models available are included.

080—INFECTIONS

The Sugar Beet Products Co. offers an interesting folder on the prevention of infections. Literature tells how to increase efficiency, production and profits through cleanliness.

081—HAND LAMPS

Two new electric hand lamps are illustrated and described in a folder of the Mine Safety Appliances Co.

082—SAFETY IN STEEL

A 20-page booklet of the American Iron and Steel Institute presenting in text and photographs and drawings the story of the steel industry's efforts in the field of industrial safety.

083—DERMATITIS PREVENTION

A new 40-page book, just off the press, by the Milburn Company deals with industrial dermatitis and incorporates the results of two new technical studies on the protection value of creams and ointments. The studies were conducted in the Milburn laboratories, using animal subjects, and the most recent of them deals with Hydro-Carbon and Petroleum Solvents. Accompanying charts show changes in the blood picture of the subjects caused by absorption of the solvents with and without protective creams, as well as less technical data of interest to safety men.

Where Safety Men Meet

Feb. 16-17, Jackson, Mississippi
Southern Safety Conference. General Chairman, Sam J. Dalton, State Highway Dept., Jackson, Miss.

Feb. 23-24, Newark, N.J.
Fifteenth Annual Eastern Safety Conference. Fred M. Rosseland, Sec.-Mgr., Newark Safety Council, 24 Branford Place, Newark, N.J.

March 27-29, 1939, New York City
Tenth Annual Greater New York Safety Conference. W. Dent Smith, Executive Vice-President, Greater New York Safety Council, Inc., 60 East 42nd St., New York City.

April 18-20, 1939, Columbus, Ohio
Tenth All-Ohio Safety Congress. Thomas P. Kearns, Superintendent, Division of Safety and Hygiene, Industrial Commission of Ohio, Columbus, Ohio.

May 9-11, 1939, Chicago, Illinois
Seventeenth Annual Midwest Safety Conference. George G. Traver, Manager, Greater Chicago Safety Council, 225 North Bank Drive, Chicago, Illinois.

May 22-24, 1939, Detroit, Michigan
Michigan State-Wide Safety Conference. C. E. Wormuth, Manager, Detroit Industrial Safety Council, Curtis Building, West Grand Blvd. at Hamilton, Detroit, Michigan.

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FL-4

THE SAFETY VALVE

[*Continued from page 3*]

Eyes Right!

"A metal working plant spent an average of $1,668 per year on eye accidents during a five-year period when goggles were required only on hazardous jobs. *Goggles were required on all jobs and these costs were cut down to $88 per year.*"

$1,800 is the average cost in eye compensation alone, not counting medical expenses, lost time, lost production and other hidden costs.

"By an inforced wearing of safety goggles, a coal mine reduced eye accidents in three months, saving an estimated amount of $30,000."

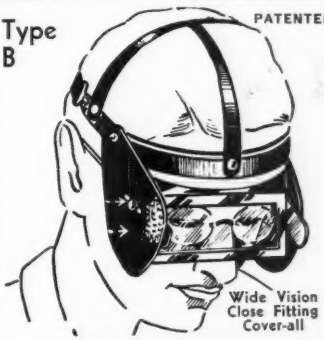
"In 166 steel mills, employing 100,777 workers, 2,397 eyes were saved over a two-year period with a cash saving of over $4,000,000." These estimates are based on the number of goggle lenses shattered and replaced by a well-known optical laboratory.

"A steel mill employing 9,000 men saved $60,000 in compensation insurance since the inauguration of an eye safety program."

During the five-year period ending December, 1930, the average compensation and medical cost of the California Wire Cloth Company of Oakland, was $12.30 per man per year. The following year, this cost was reduced to $7 by a rearrangement of equipment and the placing of additional guards at the danger points. Following a visual survey in December, 1931, the temporary adoption of plain goggles for eye protection and attention to the illumination at the working plane, the annual compensation and medical cost was reduced to $1.96." Thus, a cash saving of $10.34 per man per year in production costs was made.

Type B

PATENTED



Wide Vision
Close Fitting
Cover-all

JACKSON Eyeshields

Perfect eye protection for gas welding and cutting, blow torch work and general maintenance. Two-way adjustment assures snug fitting face comfort. Workmen who wear it a week will use nothing else. Takes standard 2" x 4¼" lens. Won't fog.

Write for circular describing complete line of Jackson Eyeshields.

JACKSON ELECTRODE HOLDER CO.
15120 Mack Avenue Detroit, Michigan

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Gauze that sticks only to itself

It is Gauztex. As white as the gauze itself. Guaranteed to remain cohesive. On the market three years. Used by General Motors, Swift, and thousands of plants large and small. Use instead of gauze or adhesive tape. Send for free sample, literature and price. General Bandages, Inc., 508 S. Dearborn Street, Chicago, Illinois.

GAUZTEX
THE SELF ADHERING GAUZE

SCREENING MOULDING SAND, A COMMON FOUNDRY HAZARD.

CASTING, THERE'S *foundry dust*

By Lawson Frenhauf

DUST is an inherent by-product of materials, processes and operations in gray iron, steel, malleable iron and non-ferrous metal foundries. For all practical purposes, it is impossible to completely eliminate dust from these operations.

However, it is possible, as well as desirable and profitable, to control such dust. For sake of clearness and brevity, let's just take those three words as points of departure for discussion. How is it possible? Why is it desirable? Why is it profitable?

How Is It Possible?

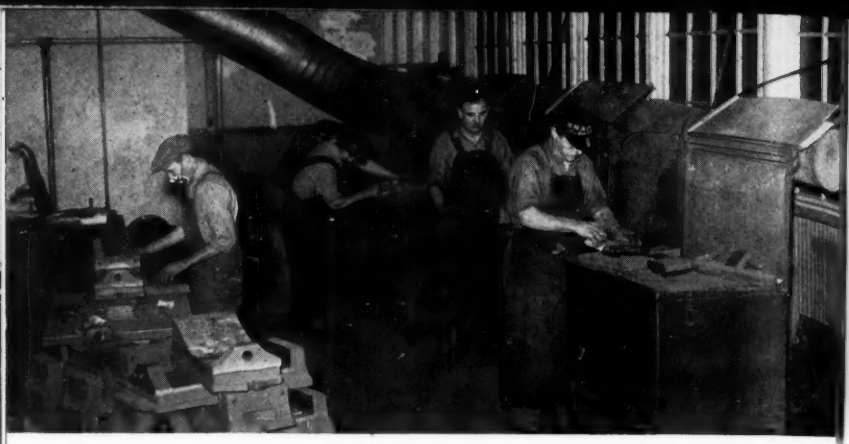
Under this question, the word "possible" includes how dust can be controlled through engineering, mechanical, manual or methods other than financial. As for the last named factor, let it be said that every plant, whether large or small, in terms of employees, production, or capitalization, can take definite steps to control the amount of dust disseminated in the atmosphere, and to employ good industrial housekeeping methods to keep the plant orderly and clean: Dust in foundries can be controlled in the following ways:

Segregation and isolation of operations which produce dust.

Most foundries (except those which are a part of large industrial plants carrying on additional production processes) are housed under one roof. The cupola, core-making and grinding and cleaning departments are in some cases carried on in one part of the central room; in other cases they are separated from the main or central room by walls. However, the dust produced in these departments, unless properly controlled, permeates the atmosphere throughout the plant. Complete isolation of the grinding and cleaning operations particularly is, in the great majority of foundries, economically possible. Separate rooms should be well ventilated and lighted, to be sure. If it is economically possible (and the expenditure will prove such in most cases as will be pointed out later) sandblast rooms should be supplied with sufficient mechanically forced draft ventilation to keep the dust created within the enclosure, and to carry it away from the operator. In addition, the operator should be supplied with an efficient air-pressure helmet.

By use of exhaust systems and dust collecting equipment.

Cleaning operations are one of the three major producers of dusts in foundries. In addition to housing them in separate rooms, cleaning and grinding operations should be sup-



Foundry workers sanding castings in advance of spray painting. Respiratory hazards controlled by exhaust system. Note the grating, with exhaust below grating and above table.

plied with adequate ventilation, dust collecting devices and exhaust systems. A vent pipe velocity of from 4000 to 5000 sq. ft. per minute will normally supply a sufficient amount of air to keep dust concentrations below danger points in the operation of tumbling barrels. Exhaust connections can be made to remove the dust from such operations.

Effective hoods and proper ducts, connected with a suitable exhaust system, should be provided to entrap and remove dust at the points of its origination. A survey and tests will determine the proper type and size of system, and proper installation to assure efficient operation.

Two final suggestions in this connection. Many states have established minimum requirements for dust collection and removal equipment. These should be consulted and followed to meet the conditions in a particular plant. Also, it is now possible to obtain equipment which performs cleaning and abrating operations mechanically "dust-free."

Suppression of dust at source of production.

In addition to cleaning operations, sand conditioning and conveying, and shake-out operations are the chief sources of foundry dusts. The conditioning of sand, together with sieving, mixing and the preparation of the mold facing sand, is usually done in the main room of the foundry, either in separate piles near the mold or in a central place and carried back and forth by conveyors. If these operations were carried on in a separate department, and the mixer equipped with positive air-pressure mask, fewer workers would be exposed. Sand conveyors should be enclosed wherever possible.

In most cases, shake-out operations are carried on where castings are poured. If sand cutting is done by shovel or cutter, the shake-out operation should be done at end of day when the least number of workers may be exposed to the resulting dust. Wetting the sand before cutting, after shake-out, will help suppress the dust.

There can be no disagreement with the statement that a clean, orderly place in which to work is more healthful and conducive to better work. Experience has shown that where steps have been taken to control dust conditions in foundries, the results have shown in two ways.

First, in the improved morale of workers. Second, in more efficient production, fewer lost castings and lower cost per finished casting. In these times when employer-employee relations play such a vital role in industrial activity, no one thing can contribute more to favorable worker-management relations than a clean, healthful working environment. Dust control means less exposure of workers to possible pneumonicoses or even silicosis. The removal of this hazard, or at least reduction of it to an absolute minimum, is in itself a definite and tangible means of achieving more stable and profitable operations. The end results show in the balance sheet. But the benefits accrue to all concerned.

Why Is It Profitable?

Looking at the question of dust control solely from a dollars and cents angle, this question must be answered: "Will dust control pay?" Management can determine that question for itself on the basis of conditions in its own plant. Strike your own balance sheet. Consider the items "boxed" at the end of this article to compare the cost of prevention and control and the alternate costs which must be borne in their absence.

Records of recent years show that in cases which have come before compensation boards, and even gone on into the courts, the liability of the employer for injuries to the health

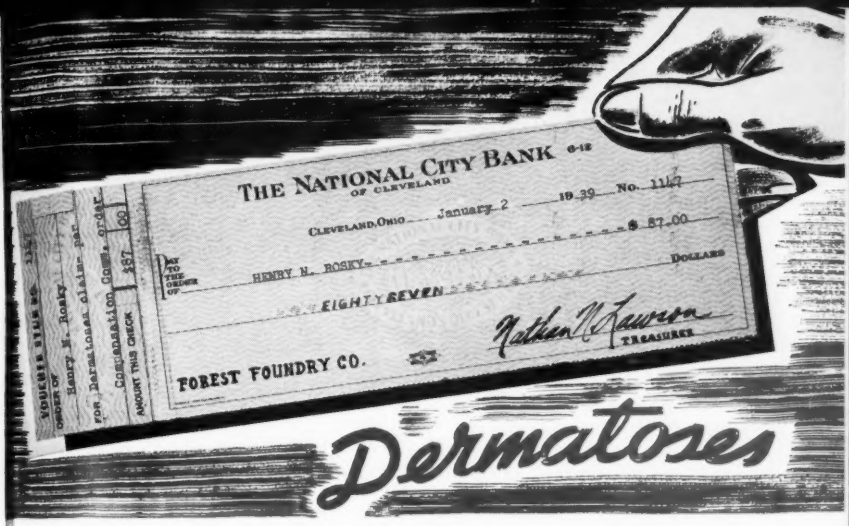
Upper photo—A foundry shakeout, the sand dropping through a grating onto belt conveyor for eventual delivery to individual mould hoppers. An easily installed exhaust system would control the marked pulmonary hazard evident here. Lower photo—A swing frame grinder exhaust, connected by flexible 6" rubber tubing to main-line exhaust. A static pressure of 4" within one foot of duct enlargement.

of workers is in itself an expensive item. In the twenty-three states which now make silicosis a compensable occupational disease, employers are required to maintain certain minimum standards of control and protection. These employers are finding that control does pay profits. Even in states where injuries to health are not now compensable by law, evidence shows that there is a desire on the part of compensation boards and the courts to place the liability and cost of such injury upon management. In states which have "elective" occupational disease laws, the employer who desires to maintain the most efficient and profitable operations will find it to his advantage to establish effective dust control measures and "elect" to provide compensation insurance for his employees. Where private insurance funds are in operation, the employer can realize lower premium costs in proportion to the effectiveness of the dust control measures he provides.

From every viewpoint, it is profitable to maintain a dust free foundry at all times. If economic reasons prohibit extensive exhaust, collection, protective and control measures, a plant can at least take every human precaution possible, and make every effort to conduct dusty operations in places where and at times when the least number of workers will be exposed to a dust hazard.

Recognizing the need for improved standards and practices in foundries, the American Foundrymen's Association has undertaken a series of engineering studies designed to establish certain standards for dust control and elimination equipment, and to bring about more healthful working conditions. Under the direction of a committee of engineers, executives and industrial hygienists, studies have been made of present dust elimination and control equipment and methods, and steps have been taken to improve these. The reports published thus far have dealt with exhaust and ventilation methods and machinery. While it is recognized that practices vary in different plants, it is hoped that general, minimum standards may be promulgated which will aid each individual foundry to meet its own conditions more satisfactorily and to solve its own problems more successfully.

Cost of Control	Costs Incurred In Absence of Controls
1. Survey of conditions to determine extent of dust hazard.	1. Undetermined liability for possible injury to health of workers.
2. Changes in methods, in location of operations, and in installation of minimum equipment for control.	2. Depreciation and replacement of machinery and equipment damaged by dust.
3. Personal protective devices.	3. Higher production costs, due to lower efficiency of workers.
4. Inspection and enforcement.	4. Labor turn-over caused by bad working conditions.
5. Maintenance of control equipment.	5. Unfavorable employee relations.



Attacks On Balance Sheets

By EDGAR C. BARNES
Industrial Hygiene Engineer
Westinghouse Electric & Manufacturing Co.

THREE principal problems confront the industrial hygienest in his efforts to eliminate all health hazards associated with work, especially those arising from skin irritations. In a study of the prevention of skin irritations in industry one is confronted first with a problem in economics—will the expenditure of money for protective equipment and examination of workmen be justified? Second, the instituting of the necessary preventive measures, which may embrace anything from a few pair of gloves to an elaborate ventilating system. Third, preserving maintenance of the preventive measures.

First, let us look at the economics of this problem. There are both occupational and non-occupational skin diseases among workers in industry. They can be classified as such but both must be given proper consideration since each one is costing industry a considerable amount of money every year. It is often thought that non-occupational skin diseases are not and should not be an expense to industry. This is not true. If all skin diseases or irritations are to be eliminated among workers it will require the expenditure of a considerable amount of money to provide the necessary pre-employment and periodic examinations to accomplish this end. If workers with skin diseases or irritations are permitted to work, there is a loss which can be analyzed by a hypothetical but common case.

For example, suppose a workman develops a skin disease which manifests itself as a rather severe itching of various parts of the body. He loses sleep at night and is continually ir-

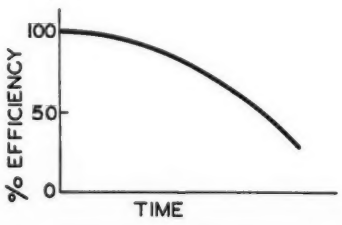
Wax boils on arm of an oil refinery workman employed as a paraffin pressman.

ritated by this condition. His working efficiency may easily be reduced by 10%, which would be worth at least $20 per month, or if his productive output is worth a large amount of money, several times this amount. He is an increased accident hazard in many ways. He may change his regular method of holding tools or performing a task to favor an irritated part of the body. He may do many things to introduce additional accident hazards and further, due to mental and physical condition, he is less attentive and alert and would be less likely to avoid an injury to himself if something unusual happened. It is difficult to fix a definite value to this, but it certainly is real. Let us assume an average of $25 per case.

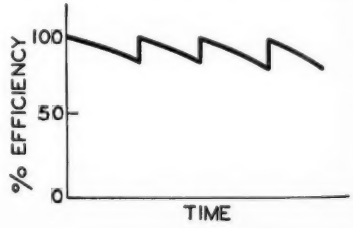
This man may next call upon the plant physician with the feeling that the condition is being caused by the material with which he is coming into contact at his work. It may be necessary to conduct patch tests on this person or send him to a skin specialist for diagnostic purposes or perhaps a simple treatment is instituted and the man returned to work. This procedure may cost from $5 to $25—let us assume an average of $10.

So far this case has cost us $55 with no lost time and if the man returns to work and there is a recurrence of the disease these costs are multiplied each time of the recurrence. It may be necessary to transfer the employee to some other work since some dust, dirt or grease may be irritating the now sensitive skin, or the man may seek employment elsewhere. It will cost at least an average of $125 to train a new man for this job.

Now this case has cost $180 and still there is no lost time or compensation costs. Cases such as this are rather frequent among a large group of workmen—many times as frequent



WITHOUT MAINTENANCE



WITH MAINTENANCE

as the more serious cases that involve lost time, compensation costs and considerable medical treatment. The cost of the more serious cases where occupational exposure has been responsible may run into four figures.

THEN add to this the intangible factors such as ill will, influence on other employees, possible reduction in quality of product, etc., and it becomes evident that from a purely economic viewpoint a reasonable amount of money should be spent to avoid such conditions.

Further, the day of the plant physician's diagnosing all minor sickness and skin disease as non-occupational is nearly past. Employees now expect adequate medical facilities and serious and expensive disputes can arise if these are not available.

The second factor in the problem is the preventive measures which will vary considerably with the type of industry, its raw materials and products, and its location. The cost of these measures will be balanced against the expenses outlined previously. The first and most important general consideration is cleanliness—proper cleansing of the skin of workmen and clean work rooms. This is without doubt the most important single item in preventing skin diseases or irritations for various reasons. Many soaps are irritating to the skin and there are also soaps that do not thoroughly cleanse the skin. Good soap, hot water, clean wash rooms and shower baths, are necessary and the first requirement for eliminating the many minor, but still expensive, cases that arise from either industrial or non-industrial causes.

Many new materials such as solvents, resins, waxes and cleaners are being introduced into industry today and many of these are skin irritants. The fact that a material is toxic or a skin irritant is one of its inherent properties, just as are its boiling point, melting point, solubility, etc. It is then important that these properties of new materials be known and all new materials be checked before being used generally in the production system. If materials produce dermatitis or are toxic, the proper safeguards can be instituted at the start and the cost of these measures will form a part of the cost of production—not an added expense after the new product is on the market.

Physical examination of new employees is distinctly a preventive measure. It will permit the physician properly to place the applicant in such work as will not be harmful to himself or others. It would seem absurd to place a man with a dermatosis of non-occupational origin on a job where this condition would be aggravated. Likewise, persons with ex-

[*Continued on page 37*]

Press cleaner victim of dermatitis from napthalene intermediates of dye origin.

COPING WITH FUMES

Visible and invisible air-borne hazards can now be determined and controlled by modern **METHODS AND EQUIPMENT**

By R. J. LITTLEFIELD, *Research Engineer*, Mine Safety Appliances Co.

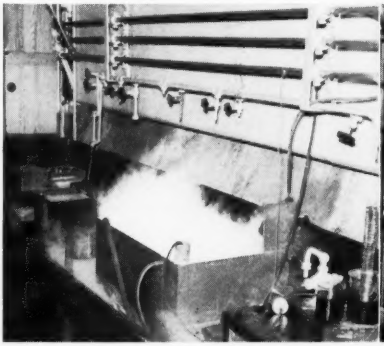
FOR many years there was a considerable amount of guesswork regarding the materials and processes of industry that are productive of toxic fumes, dusts and vapors. There was even more pure speculation as to the effects these agents had on the human system, in what amounts they were tolerable without injury, and how to detect and ward against them.

Research and mechanical achievement have joined in solution of the principal occupational hazard problems of this character. The hit and miss methods have given way to means of intelligent, effective detection, prevention and control.

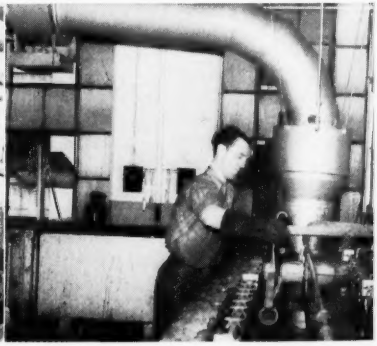
The unaided eyes and nose are highly fallible indicators of the need for protection against fumes, gases and dusts. Some of the substances are so small that they cannot be seen with the human eye. Substances which smell the worst are not necessarily dangerous at all. On the other hand, substances which can neither be seen nor smelled are sometimes quickly fatal under certain conditions.

Fumes are substances which may well be used to illustrate this point. A general characteristic of fumes, at least shortly after they are generated, is that the particles are uniformly very small, usually with the greatest

Testing electroplating apparatus with nitrogen fumes to show air flow and hazards.



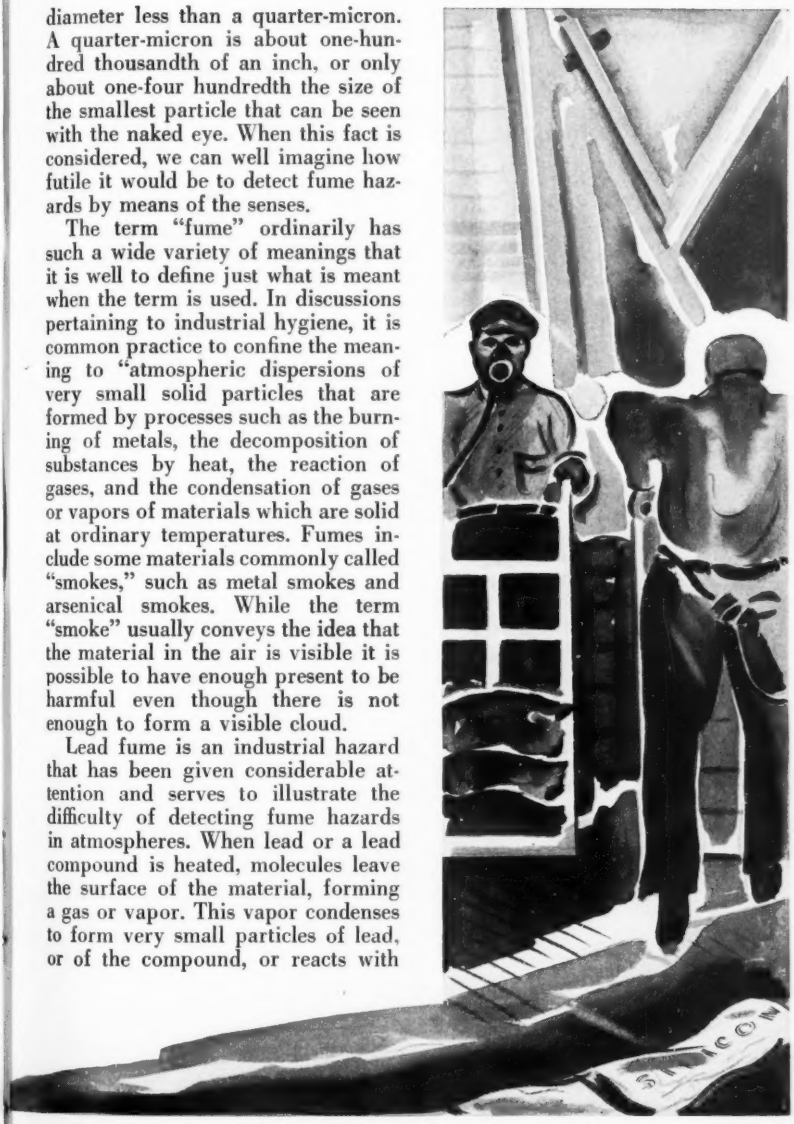
Worker at chrome plating tank, protected by fume filter and 2000 FPM exhaust unit.



diameter less than a quarter-micron. A quarter-micron is about one-hundred thousandth of an inch, or only about one-four hundredth the size of the smallest particle that can be seen with the naked eye. When this fact is considered, we can well imagine how futile it would be to detect fume hazards by means of the senses.

The term "fume" ordinarily has such a wide variety of meanings that it is well to define just what is meant when the term is used. In discussions pertaining to industrial hygiene, it is common practice to confine the meaning to "atmospheric dispersions of very small solid particles that are formed by processes such as the burning of metals, the decomposition of substances by heat, the reaction of gases, and the condensation of gases or vapors of materials which are solid at ordinary temperatures. Fumes include some materials commonly called "smokes," such as metal smokes and arsenical smokes. While the term "smoke" usually conveys the idea that the material in the air is visible it is possible to have enough present to be harmful even though there is not enough to form a visible cloud.

Lead fume is an industrial hazard that has been given considerable attention and serves to illustrate the difficulty of detecting fume hazards in atmospheres. When lead or a lead compound is heated, molecules leave the surface of the material, forming a gas or vapor. This vapor condenses to form very small particles of lead, or of the compound, or reacts with



the oxygen of the air and forms solid particles of lead oxide. These particles are lead fume. Fumes of other metals or compounds can be formed by a similar process. It is not necessary, however, for a chemical reaction or decomposition to take place. Fumes, as a class, have an average particle size much smaller than do dusts, for example, and fume particles are created by chemical or physical processes instead of by the mechanical breaking up of larger particles, as in the generation of dusts. With substances such as white arsenic a vapor is formed when they are heated and this vapor may condense on cooling to form very small airborn particles of the original substance. This process of vaporization and condensation without going through a molten or liquid state is called sublimation.

The temperature of a substance does not have to be raised to its boiling point to cause the generation of harmful concentrations of fumes, for molecules leave the surface at much lower temperatures and the amounts of some fumes which can be tolerated are extremely minute. Lead, for example, boils at 1620°C. (2948°F.), but even at 636°C. (1177°F.) sufficient vapor leaves the surface of the metal to cause dangerous concentrations of lead fume.

Sources of Industrial Fumes

The sources of industrial fumes are varied and numerous, any process in which toxic metals or compounds are heated may produce dangerous concentrations of fumes and the extent of the hazard varies with the temperatures necessary for the process, with the area of surface exposed, and with the amount of agitation resulting from operations such as stirring, dipping, and pouring.

Testing for degree of lead fume hazard with an electrostatic dust and fume sampler, a favorite method of many investigators.

The following list includes some of the better known industries and operations in which harmful fumes may be found:

1. Metallurgical Industries:
   - (a) Sinter Machines.
   - (b) Blast furnaces.
   - (c) Drossing Kettles.
   - (d) De-Silverizing kettles.
   - (e) Softening furnaces.
   - (f) Reverberatory furnaces.
   - (g) Cupels.
   - (h) Bessemer converters.
   - (i) Pouring, molding, and casting.
   - (j) Manufacture of alloys as brass, bronze, solder, babbitt and type metal.

2. Manufacture of Glass, Pottery, and Chinaware:
   - (a) Preparation of frits.
   - (b) Burning glaze or enamel.
   - (c) Addition of colors or decolorizers to molten charges.

3. General Manufacturing.
   (a) Molding grids for storage battery plates.
   (b) Burning storage battery connection.
   (c) Soldering operations.
   (d) Terneplating.
   (e) Metalizing by spraying molten metals.
   (f) Electric Welding.
   (g) Oxy-acetylene welding.
   (h) Manufacture of lead covered cable.
   (i) Manufacture of lead pipe.
   (j) Diecasting.

4. Construction.
   (a) Riveting—as through plates coated with red lead paint.
   (b) Welding
   (c) Oxy-acetylene cutting especially with painted and plated material.
   (d) Plumbing.

In some of the operations listed, only very small amounts of materials are heated, but with high temperatures, the concentrations of fume may be relatively great.

Detection of Fumes

The detection of hazardous industrial fumes requires first a knowledge of the processes and materials which may generate them as well as suitable methods of sampling and analysis. There are no simple detectors for these contaminants as there are for many poisonous or explosive gases. The experienced industrial hygienist recognizes the operations and processes which may produce fumes and looks for deposits of fume on equipment and machinery. Around a weld, for example, especially on a vertical piece, there is usually a grey, yellow, or white deposit; this is fume which has adhered to the cold surface.

For quickly making semi-quantitative estimations of the presence of fumes an instrument such as the Konimeter can be used. This device is very small, is simple to use, and can collect a number of samples in rapid succession. The Konimeter is, however, a "grab "sampler and does not collect enough fume for precise quantitative determination by chemical analysis. It is useful, however, for the experienced person who can determine whether a sample is dust,

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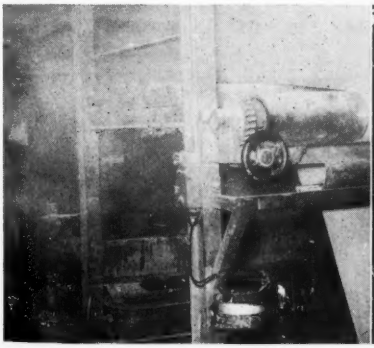
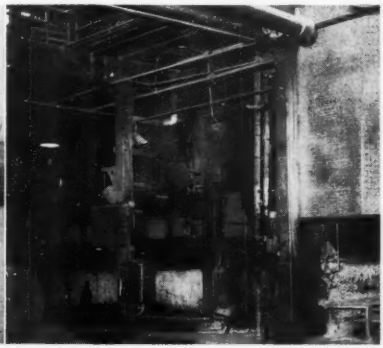


Asphalt fumes coming off an inefficiently hooded asphalt roll roofing machine.



View of a similar asphalt roofing machine, showing fume elimination by correct hooding.

This month in *Washington*

By W. T. CAMERON
Chief Safety Adviser, Division of Labor Standards, U. S. Department of Labor

IN THIS column I have been trying to keep the readers of *Occupational Hazards and Safety* up to date on current government activities and to outline what the regular established agencies are doing to create a greater consciousness of safety and health in the various segments of the industrial life of the country. There is one agency, however, whose activities, while seldom if ever thought of in this connection, are bound to be most far reaching in reducing our industrial occupational disease and accident toll. This newly created agency is the Wage and Hour Division of the U. S. Department of Labor, administering the Fair Labor Standards Act of 1938.

It is a well known fact that the only real progress made in accident prevention and health conservation has been made by the larger industrial concerns of this country. "How are we going to reach the small plants with our safety and health message?" is always a subject of conversation whenever safety men get together. It is generally recognized that the problem is far broader than simply one of getting the small plant to install a few safety devices, form a safety committee, or put a few posters on a bulletin board. A poor accident record goes hand in hand with poor operating efficiency, dirty industrial housekeeping, long hours and poor wages.

Safety men have long recognized that it is almost impossible to instill into the mind of the employer who in no other way assumes a moral obligation to his workers or to society any degree of safety consciousness. Something was needed to change this type of employer's outlook before he could be reached with the safety message. The Fair Labor Standards Act of 1938 is providing the basic social and economic improvement which in turn will lead to better human relationships and safer and better working conditions.

The Fair Labor Standards Act provides "a floor for wages, a ceiling for hours and a break for children." We have heard a good deal about the economic aspects of this law which will give all workers an income large enough to buy the products of other workers—and some leisure time in

which to enjoy those products. But under what interpretation is the Wage and Hour Law a safety law?

One doesn't need to be a psychologist or an efficiency expert to know that an undernourished, poorly clothed worker, worrying about the rent and the grocer's bill is a poor accident risk. Safety depends to a large extent upon alertness, agility and a mind free to concentrate on the job at hand. A guaranteed fair minimum wage is just as effective a safeguard in any plant as a hood over an emery wheel or a pair of safety shoes.

It has required centuries of effort to educate both the employer and the worker that long hours of labor were not desirable for either. Every safety man will tell you and can prove by statistics that after a certain number of hours of labor—particularly if it happens to be a mechanical operation involving only manual dexterity—the likelihood of accidents increases in proportion to the number of hours worked. Not long ago one of the leaders of Organized Labor said: "Should we suppose that those who oppose a reduction in the hours of labor are willing that these accidents may happen? Certainly not. Possibly it has never been considered by them from the standpoint of safety. But Labor does consider it from that point of view. After all, Labor's stock in trade is—Labor. To the man who works his labor is his capital. Invest his time, his energy, his health, and sometimes his very life in his job, and surely he is entitled to all the safeguards possible for such an investment so that it will pay to him an adequate dividend, not alone in wages, but in health, in continuing strength, in peace of mind, in safety and in some measure of human happiness."

As to the "break for children," in safety the law provides: (1) a basic 16-year standard, with provision for light work outside school hours between the ages of 14 and 16 years under safe conditions in occupations other than mining and manufacturing; (2) an 18-year standard for occupations found to be particularly hazardous or detrimental to health or well-being; (3) fair wages and reasonable hours for both minors and adults and definite safety and health provisions for learners and apprentices.

So while not generally considered safety and health legislation, the Fair Labor Standards Act will do much to further the conviction which has grown up in industry in the past 25 years—that industry has a right to the labor—but not to the health, lives and limbs of those who are employed in it!

It is a significant fact that working conditions conducive to health and safety are placed before better wages and hours in the goals of organized labor. Spokesmen for labor have asserted that it considers such working conditions not only more important but, in many cases, more difficult to obtain. The Federal Government is 100 per cent behind labor, and enlightened management, in all efforts looking towards safer, more healthful working conditions.

COPING WITH FUMES

[*Continued from page 19*]

fume, or both by immediate observation through an attached microscope.

Sampling and Determination of Fumes

The sampling of fumes for accurate determination of composition and amount is rendered difficult by the small size of the particles which must be collected and by the very small amounts which are of hygienic significance. The apparatus for collecting the sample must be efficient for collecting these minute particles from a very large volume of air in order that sufficient material may be obtained for present analytical methods.

Selection of sampling points is another important consideration in studying a fume hazard. These points must be selected with two general purposes; first to determine the hazard to each worker and second to trace the sources of the fume. For the first purpose, the samples must be collected at the breathing level at points where men work. For the second purpose, the points are selected near operations that are suspected as sources and in air currents which may carry the fumes to other parts of the plant. Sufficient samples must be collected to permit calculations of the average exposure of each workman.

It is very essential to use a reliable sampling method and to collect the samples at locations that give the required information. The old paper thimble or disc filter method has several disadvantages as a collector for fume samples; they are, first, low sampling rate unless large filters are used; second, initial leakage, especially with more rapid filters; and third, a continual build up of resistance, requiring constant adjustment.

The Greenburgh-Smith Impinger overcomes these disadvantages, but recent tests have shown it to be only 21 to 71 per cent efficient for collecting lead fume. The efficiency depends to some extent upon the age of the fume cloud, because the average size of the particles increases with aggregation which proceeds more or less rapidly for different fumes. The impinger is, however, a satisfactory device for collecting many other fumes and dusts, and mechanically generated lead dust.

The most efficient sample collector for fumes is now commonly accepted to be the electric precipitator. A recent development of this principle is the electrostatic dust and fume sampler, which was described in the December issue of *Occupational Hazards & Safety*. This device operates with a direct current potential of 10,000 to 11,000 volts, causing the fume particles to be repelled by the electrode and attracted to a grounded cylinder. For all practical purposes, the efficiency of this sampler can be considered to be 100 per cent.

Selection of analytical methods depends upon consideration of the materials which may be present. A few samples should first be subjected to qualitative analytical procedures to determine the presence of suspected contaminants such as lead, zinc, arsenic, antimony, manganese, selenium, cadium, and bismuth. Sensitive analytical methods for all such elements are available but it must be understood that the analytical procedures used in industrial process control are generally unsuited for the minute amounts of material obtained from air samples.

Dangerous Boomerangs

PENNY-PINCHING METHODS IN Sanitation ARE DANGEROUS BOOMERANGS IN THE HANDS OF MANAGEMENT

By NATHAN LEWIS

A GREAT many plant managers and superintendents are like a great many wives. They started out to be first class housekeepers when they were brides, but they've grown careless and slipshod since. Disagreeable family fracases and an occasional trip to the divorce courts are the results in the instance of the wives. Poor employee morale and an occasional trip to the compensation courts are the results in the instance of the managers and superintendents. Bad housekeeping practices are sure-fire boomerangs.

Safe Floors

Accumulations of dust, dirt, grease and oil or oily liquids on the floor are definite hazards. Slips and falls account for approximately 25% of all industrial accidents. The type of building and the nature of the manufacturing process and materials should determine the type of floor which should be in any particular plant. However, every floor needs thorough cleaning daily and regular inspection for wear and repair. Daily cleaning will not only remove oils, grease and other materials which may cause slips, but will remove dusts which might otherwise be health hazards. This latter reason is particularly true in industries where certain types of metals are used. Metal dusts are not only nuisances, but may be toxic in their effect on workers.

Pitted spots, cracks and worn places in floors should be repaired as soon as they appear. On surfaces around machinery, on stairs, loading platforms, and other particularly hazardous zones, special types of flooring, of composition material or raised surfaces, should be installed.

Illumination

A light, well illuminated plant is always cleaner, more cheery and a safer, healthier place in which to work. In addition to providing the maximum amount of window space for admitting natural light, proper artificial light should be provided in corners, around machinery and other dark places. An ally of proper lighting is paint. Painted walls, ceilings, girders and equipment encourage cleanliness and brighten the appearance of a plant. They are easier to keep clean and offer all-round better working conditions.

Cleaning

Although brooms, mops and brushes are still an important part of the cleaning equipment of a plant, mechanical machinery has to a large extent taken over most of the job, resulting in easier and better work.

ALL dust, of course, should be removed at its source whenever possible. This will not only make the cleaning job easier but will help protect the health of workers and remove the dangers of dust explosions. Automatic dust collection systems, if properly installed after a careful survey of the problem and operations, offer the best solution to this problem. Portable dust collectors, vacuum cleaners, stationary systems and scrubbing machines will aid in keeping floors, walls and other places clean and orderly. If sweeping operations are used, it is suggested that the floors be moistened first or a sweeping compound used in order to keep down the dust. Girders, beams, tops of storage bins and cabinets, and other places where dust is likely to lodge should be cleaned regularly, preferably by suction methods in order not to throw the dust particles into the air or give them a chance to accumulate in some other spot. You can't sweep industrial dust "under the carpet" and get away with it.

Below—Modern locker room with individual lockers, built-in seat benches, sash windows, circular washfountains and sanitary showers. Right—Efficient, dust-free cleaning with a portable vacuum unit.

Photos courtesy Republic Steel Corp. and U. S. Hoffman Machinery Corp.

Sanitation

Workers want to keep clean and will keep clean if proper and adequate facilities are provided. It is the responsibility of every plant to provide for its employees sanitary drinking, washing, bathing and toilet facilities. Air and light, and soap and water are still the old standbys in personal cleanliness. The water bucket and common drinking cup, the sawdust box or metal cuspidor, the roller towel, the dirty wash bowl, the nail for hanging clothes, along with the outdoor toilet are nonexistent in a sanitary plant. With all these facilities easy and economical to install and maintain today, there is no valid excuse for any plant to tolerate unsanitary conditions.

Plants today recognize the importance and economic value of carrying their health and safety programs right into the plant washrooms. Such plants have a sound investment in health, sanitation and safety—an investment which will pay dividends in the form of better worker morale, improved employee-employer relations, better production records and lower compensation costs. Well equipped locker rooms, with individual lockers, should be provided where men change from their street to work clothes at the plant. In plants where toxic materials are handled a separate locker should be provided for the worker's clothes. Shower baths are standard equipment in many plants. Wash troughs and circular washfountains are sanitary improvements in offering better wash-up facilities. Another step in the direction of better plant housekeeping is the use of paper towels which can be discarded after use.

Contrasts in drinking facilities. The up-turned water spigot, bucket and dipper and similar disease spreaders are everywhere giving way to sanitary, more refreshing cooler units.

Photos courtesy U. S. Dept. of Labor and Westinghouse Electric & Manufacturing Co.

While the cake of soap is still much in use, some plants have found that the installation of soap dispensers for powdered or liquid soap finds better acceptance among employees and saves money in the long run.

Adequate toilet facilities, sanitary and easily accessible and cleaned are necessities in every modern plant. Toilet rooms should be well ventilated and well lighted. Standards of drinking facilities are constantly improving along with other sanitary equipment. Paper receptacles which can be destroyed are being provided in place of sawdust boxes or unsanitary cuspidors.

By FRED W. LIEBERG
B. F. Sturtevant Co.

DOLLARS & SENSE IN *Vacuum Cleaning*

OCCUPATIONAL disease laws put dust in the front rank as a formidable foe. Gases from processing settle as dust—very fine dust—on pipes, ledges and rafters. Out of sight, out of mind—yet a menace of the first order. The safe way to collect fine dust is by vacuum. In this way it is collected and stored dustlessly. If it is valuable it can be reclaimed. Many dusts are valuable enough to reclaim, and labor cost and the investment in vacuum cleaning equipment pay dividends in this way in many industries.

What is the economic side of vacuum cleaning as applied in industry? As an investment, just where do we find returns in dollars and cents? Admitted that by moving the dust, dustlessly, we have kept "dust in suspension" to the minimum, thereby improving working conditions, and in many instances improving the quality of the product, that gain can be shown through the employment of vacuum cleaning instead of, say, the broom and pan method of cleaning

When consideration is being given to vacuum cleaning for industrial service the weight of the dust per cubic foot and the shape and size of the litter to be collected will have some bearing on the type of nozzle to be employed, and the suction to be maintained at the throat of the nozzle. Generally speaking, it may be said, that, to collect light dust, it requires comparatively low suction and small volume. Light bulky litter requires relatively low suction and large volume. Heavy dust and litter require high suction and large volume in proportion.

Vacuum cleaning can definitely im-

prove many products. However viewed, and quite remote from food stuffs or processing where contamination is a problem, a product benefits either in factory workshops or as a stored package. When dust is removed by vacuum the cause for blemish or discoloration is frequently removed. The handling is clean because hands and surfaces are clean. Rejects, seconds, shrinkage and spoilage are reduced. In the laboratory, tests come nearer accuracy, for contamination and pollution have been reduced. We cannot readily measure the savings, but there are savings to be made.

HEALTH conditions are improved when the vacuum cleaner is systematically employed. All dust having been removed from ledges, cracks and crevices, vibration and shock cannot send showers of germ laden dust from overhead rafters, pipes and ducts, to lodge on clothing and bodies of workers. Where dust is in normal suspension, as in certain processing, the conditions can be greatly improved through periodic collection of the pyramiding dust heaps. The vacuum cleaner does the job dustlessly. Here again we cannot accurately measure the savings. Certainly the workers are benefited and, all things equal, the product, too.

When dust is systematically removed from all surfaces at frequent intervals, the fire and explosion hazard is greatly reduced. Static dust of itself will not cause an explosion. But a primary explosion, through dust in suspension, will bring down showers of dust accumulation to cause secondary explosions and fire havoc. In some industries premiums are lower for insurance when vacuum cleaning is maintained. Like the sprinkler system, it is insurance in itself. There we have a great saving.

We give you now the result of time study. There are many factors to take into consideration in a case of this kind. We cannot say it is representative. We cannot offer it as a yardstick. It is most unlikely that any two cleaning areas would work out exactly the same, even though identical in arrangement and in the amount of obstacles for we have the human element to contend with. One operator will tackle his job entirely different to another and a few minutes may be added or chopped off on a job of the kind we are considering. However, it will give some idea of what has happened. The study would look

Overhead ledges, piping and other dust collecting places inaccessible by ordinary cleaning methods yield readily to vacuum cleaner gooseneck brush attachments.

entirely different had we been cleaning a gymnasium for instance. And again quite a different story if we were cleaning the pouncing room of a fur felt hat factory. We purposely omit giving the area cleaned since it would be confusing.

THE EQUIPMENT IN USE for our first investigation was a portable vacuum cleaner weighing 65 lbs. With it was 25 ft. hose weighing 14 lbs. and a 25 ft. length electric cable. The suction maintained at the nozzle throat was 2″ mercury. The nozzle used was a 12″ bare floor tool. The cost was about $150.00.

The area cleaned with the above equipment was the same as with the broom.

The actual cleaning time was	40 mins.
Time moving machine ..	8 mins.
Time changing cable	4 mins.
Time emptying dust	3 mins.
Total	55 mins.

THE EQUIPMENT IN USE for our second investigation was a central plant stationary system. Using a 25 ft. hose weighing 14 lbs. The suction maintained at the nozzle throat was 2″ mercury. The nozzle used was a 12″ bare floor tool. The cost of the system (2 sweeper) was about $1500.00 The area cleaned with above equipment was the same as with the portable vacuum cleaner and broom.

Actual cleaning time was	42 mins.
Time moving hose was ..	4 mins.
Time emptying dust was ..	2 mins.
Total	48 mins.

THE EQUIPMENT IN USE for our third investigation was a 12″ wide, soft hair broom, and a dampened cloth. The area cleaned with the above equipment was the same as with the portable vacuum cleaner and the stationary vacuum cleaner.

Actual cleaning time	35 mins.
Time "dusting" after cleaning	8 mins.
Time disposing of collected dust	3 mins.
Total	46 mins.

Now it might appear that the honors go to the broom and pan manipulator. He does his job in 46 minutes, and 35 minutes of that time was for actual cleaning (sic). But he did not do what he set out to accomplish. He went through all the movements. And it "looked" as though he had been on the job. On examination we, however, find he pushed into or left behind him in cracks and crevices 10%; scattered into suspension 5% or more and could not account for another 5% of the dust which the vacuum cleaners had collected and stored in their respective containers. And, furthermore, our broom and pan wielder put a film of dust on walls and ledges and overhead surfaces which some time later he, or somebody else, must remove.

Over a period, vacuum cleaning has established itself as the economical method. Whether of vegetable or mineral origin dust is, speaking generally, a menace to mandkind. It frequently carries with it disease germs and may be of a poisonous nature, to say nothing of its abrasive, contaminating, discoloring and other effects on products. Whatever its character, dust in industry is a nuisance. The complete removal of dust, not just moving it again and again, is the safe and sure way to dispose of it.

Right off the Docket

The trend of litigation on matters of workmen's health and accident compensation. Reports based on court decisions in the latest and most representative cases to come to trial in the intervals between issues of this magazine.

Death by Lung Embolus From Fracture of the Ankle

A RECENT Massachusetts case evinces very clearly the far reaching effects that may result from a simple injury. The case arose on appeal from an award of compensation for the death of an employee. The employee suffered a fracture of the ankle which was a compensable injury. After being in the hospital six days, an operation was performed on him for the relief of a three year old hydrocele (a disease of a sac in the scrotum), unconnected with the injury. Twenty-one days afterwards he died from an embolus (blood clot, or other foreign body in the blood) that reached his lung. The claimant asserted the embolus resulted from the fracture. The defendant claimed it was caused by the operation.

The Court held that since the fracture would destroy much tissue, break blood vessels, and form clots, while the operation would cause little bleeding since the veins involved were small and speedily tied, it was probable that the fracture was the cause of the embolus. The award was held to have been warranted. GEAGAN'S CASE (Mass.) 17 N.E. 2nd 172 (October, 1938)

Heart Failure Compensated Despite Diseased Condition

The death of the employee in this case resulted from a heart strain brought on by lifting a window sill. The employee had a preexisting diseased heart condition. The Court held that the evidence supported a finding that the death was compensable; that it was not caused solely by the preexisting disease, but that the strain caused damage to "the physical structure of his body." SOUTHERN UNDERWRITERS vs. HOOPES (Texas) 120 S.W. 2nd 924 (October—1938).

Cases wherein awards are granted because of injuries to the heart may have greater importance than a first glance might indicate. It may be that the tendency toward liberality in industrial law will lead to compensation for heart conditions irrespective of sudden strains or other accidents, causing damage to the physical structure.

Injured While Lunching; Hospital Injury Increases Disability

A workman customarily ate his lunch in the machine shop near his machine. On the day of the accident he had finished eating and went to wash a milk bottle in the back of the shop. While returning he fell over a stool and broke his leg. The court held that the accident happened within the course of the workman's employment.

Taken to the hospital the workman experienced further injury when his arm was hurt during the process of changing sheets on his bed. An award was made for the additional disability, since this accident also was held to be within the course of employment as "the second injury was directly attributable to

Digested and compiled

By HILTON C. ROBERTS
Member Ohio & New York Bar

the first." FLANAGAN vs. CHARLES E. GREEN & SON (New Jersey) 2 Atlantic Rep. 2nd 180 (November—1938).

The Courts Speak on Construction of Compensation Statutes

"The workmen's Compensation Act should be liberally construed to affectuate its beneficient purpose." SLOSS-SHEFFIELD STEEL & IRON CO. vs. NATIONS (Alabama) 183 So. 871 (Oct.—1938).

"A liberal construction will be given to workmen's compensation law so that its beneficient purpose may not be thwarted by technical refinement of interpretation." LUDWICKSON vs. CENTRAL STATE ELECTRIC Co. (Neb.) 281 W.W. 603 (Oct. —1938).

Other Recent Holdings

Proof that cerebral hemorrhage caused death of maid in hotel while maid was at work and was brought on, produced, or caused by her having to lift and carry heavy loads and more heavy furniture would establish "accidental injury in the course of employment," entitling maid's dependents to compensate for her death. CARTER vs. TRAVELERS INSURANCE Co. (Texas) 120 S.W. 2nd 581 November—1938).

Evidence warranted finding that hernia "arose out of and in course of employment" of city employee who strained his back lifting a barrel. CHMELOWSKI'S CASE (Mass.) 17 N.E. 2nd 165 (Oct.—1938).

First Aid Negligence Costly

A HELPER in a storeroom of a porcelain factory in Wheeling was engaged in breaking up crates and boxes, and removing the nails from them. He stepped on a half-inch, flat-headed nail, which was covered with packing material. The nail penetrated his shoe and entered the ball of his left foot. The worker applied a disinfectant and continued his work without reporting to the first aid room. The next day he felt pain in the foot and reported for medical attention. The doctor treated the wound but the next day blood poisoning developed and in order to check the infection it was necessary to amputate the left leg. This unfortunate and costly accident no doubt could have been prevented if the injured worker had reported immediately for first aid and received proper attention.

Paper Mill Fatality

A BEATERMAN employed in the beater room of a Middletown paper mill was fatally injured on Octo-

[*Continued on page 40*]

"THE ACCEPTED STANDARD OF MERIT"

PLY FOR PREVENTION OF INDUSTRIAL SKIN DISEASES

Protects Against Hydro-Carbon and Petroleum Solvents

Send For Our New 4th Edition Descriptive Book Just Off the Press

MILBURN CO., DETROIT, MICH.

DISTRIBUTORS IN ALL PRINCIPAL INDUSTRIAL AREAS

SELLING SAFETY

Safety programs consist of making people do what's good for them. People don't like to do that. Here's a salesman's idea on how to sell them the proposition.

The Author—ROY H. WARMEE
Philadelphia Coke Company

BOAKE CARTER recently devoted his daily column to The Engineer. He said "Intentionally, the engineer is probably the most constructive of all human beings; unintentionally, the engineer is likely to become the most destructive of all human beings." Without an explanation, this thought could not go unchallenged by the safety engineer. But he (Boake Carter) said that the engineer, in his anxiety to simplify the mechanical action of living, has forgotten to teach the users of the creations of his genius the dangers of abuse, and here is where the Safety Engineer fits into the scheme of things.

There are two important factors in all human endeavor—environment and human behavior. Of the two, the former is, by far, the easier to create and to accomplish. It lends itself more easily to practice and its results are tangible and more immediate, and yet the safety engineer must reckon with both. They go hand in hand.

How can we go about attaining improvements in environment and human behavior in safety? First, by engineering for safety; second, enforcement by rules and regulations; and third, education by suggestion and repetition. The first of these is the environment factor and the second and third relate to human behavior.

It seems to me that the function of the Safety Engineer includes everything that promotes the health, the comfort, the safety and well being of the rest of us. Isn't it true that the mechanical side of the job is the easiest? Once we know what needs to be made safe (for instance—guards, goggles, life belts, etc.) then it is comparatively simple to bring these things into being. And isn't it true that enforcement by rules and regulations is also possible, but not so easy as the construction and the provision of safety devices and tools to work with? But the education which concerns human behavior is the factor that challenges the thinking of all people under his leadership.

The Safety Engineer needs some of the qualities and characteristics of a salesman. In other words, in terms of the salesman, safety is a thing to

be sold; first, to management, if we are dealing with an employee problem and, secondly, to the employee himself or to the public at large, for selling is the business of making people want and buy and do things that are profitable to them. Safety in its broad application is making people do things that are not only good for them, but good for others as well. It is the salesman's job to do likewise. Good salesmanship builds desire and sets a high regard for that which is being sold. It is essential that a safety program have for its objectives the same high purposes.

What are the elements of a sale if you agree that safety is a thing to be sold? In the first place, every salesman should analyze his sale—is it a commodity, a service; is it tangible or intangible and what are the buying motives? We all know that safety is not a commodity. Some of us may think of it as a service, but in reality it is nothing more than the selling of an idea or an ideal, the same as you might sell a boy or girl on the value of going to school.

And so, whether we sell commodities or ideas, tangibles or intangibles, there are two basic buying motives—rational and emotional, and we know that the emotional motives more frequently play an important part in the purchases. We also know, in selling, that the technique required to sell intangibles is to appeal to the emotional rather than the rational side of men.

However, complete uniformity never exists. Sales experience shows that one motive or another, and sometimes even a group of motives tend to prevail in inducing customers to purchase a particular article. Advertising men also know that they can count upon the large groups of consumers to respond to their efforts to incite buying motives.

Elmer Wheeler of "Test Sentences" fame told the story of the old medicine man who can open up his stand on any street corner and within 3 minutes he has customers because he shouts words that capture their ears. They are 10-second sales messages:

"Do you feel tired at times?
Do you feel like getting up?
Do your feet hurt every night?
Can you jump a three foot fence?

If you can't, then step right up here, gentlemen, and let me show you something that will put "pep" into your blood, make you feel like a day in spring, a trip through the mountains and as refreshed as an ocean breeze."

The medicine man is playing on your fears or your desires. He is hitting a basic buying motive—self-preservation. You are skeptical, but when he starts playing on your emotions his words are music to the ears of the sufferers, especially of imaginary ills.

Do not let yourselves become too prosaic, too matter-of-fact in your job. You have one of the great functions of modern man to perform, a great story to tell, and you are rendering an invaluable service. What more can you ask?

And even when you sell logically, you are more likely to succeed when you use logic to flatter your buyer in terms that make him feel that he is a sensible and good buyer. That appeals to his pride and pride is not intellect, but feeling.

And so, if safety is a thing to be sold and sold effectively, we should deduce from all of this that it is to

be done in the method and the way of all good selling—with dramatization, advertising, showmanship, personal effort and using all the media at the command of a modern sales department.

Our sales contests and quotas are your "No Accident" campaigns. Our prizes to outstanding salesmen are your rewards for life-saving and your plaques and trophies for excellent "No Accident" records. Our sales meetings, where we teach salesmanship and study our problems, are your safety meetings where you do likewise. Our "ads" to sell commodities are your posters to sell ideas. Our visual education such as charts and pictures, movies, etc., are yours also. Our sales manuals are your texts. Our teaching the salesman to sell so that the public will buy is like your teaching the public to respond to your appeals and then obey. Teaching the salesman to be conscious in his deliberations and sub-conscious in his actions is like teaching the public to be conscious of safety and subconscious in its application. And all of this is for the single purpose of influencing the human being to right conduct and it brings its own reward.

We know that the sales meeting is only the beginning; the sale is the end, and we know the value of cooperation and discipline and adherence to the rules. We know the necessity and the value of dramatizing and lionizing the hero and we try to know the human side for we believe it's not the brick and steel that make a plant, but it's man power and it's brain power. And then we know, too, that it's only possible to improve your batting average by percents and the best hitter in the big leagues is a good hitter when he gets one out of three trips to bat.

Courtesy and tact help a lot, too. Remember the old story in which Sambo said to Rastus "Don't you know the difference between tact and courtesy? I'll tell you. If you were called to a lady's room and you found that lady in a bathtub, you would say "Excuse me—sir." Now the "Excuse me" part of it is plain courtesy, but the "Sir" that is tact. Such opportunities occur to every Safety Engineer day in and day out.

** Abstract of address delivered before the recent 15th Annual Regional Safety Engineering Conference and Exhibit, Pittsburgh, Pa.*

CESCO devotes their efforts entirely to head and eye protection equipment. That's one reason why our line of goggles, spectacles, masks, respirators and shields are preferred. They provide maximum protection with wearer comfort.

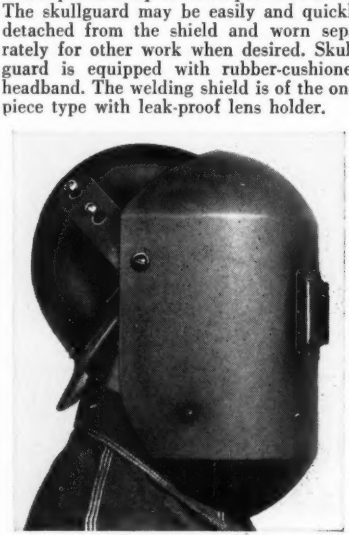
Send for new catalog just off the press.

CHICAGO EYE SHIELD CO.
2300 Warren Blvd. Chicago, Ill.

New Produ

SKULLGUARD—WELDING SHIELD

A NEW combination skullguard-welding shield is announced by Mine Safety Appliances Co. It is claimed that the comfort and protection of a standard cap-type skullguard is combined in this unit with the latest model one-piece welding shield, which pivots to up or down positions easily. The skullguard may be easily and quickly detached from the shield and worn separately for other work when desired. Skullguard is equipped with rubber-cushioned headband. The welding shield is of the one-piece type with leak-proof lens holder.



NEW ELECTRIC HOIST

Yale & Towne, Mfg. Co., Philadelphia announces a new air-cooled electric hoist designed to overcome the problem of excessive brake heat. Blower action to produce an effective degree of low pressure air circulation and cooling on the brake frictional parts is included to achieve this feature. Capacity of the electric hoist is from ¼ to 6 tons.

INSULATION TESTER

Safety features claimed for a new insulation tester, which has been announced by the Ideal Commutator Dresser Co., Sycamore, Illinois, are a three-wire primary

cord, spring operated cover over hi-potential secondary test points, and a red indicating lamp. The device tests up to 2500 volts, quickly indicating a short, ground or broken wire. Especially suited for testing insulation of low-voltage equipment. All current-carrying parts are insulated.

H_2S DETECTOR

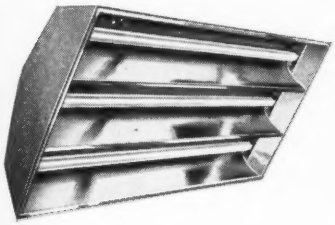
A new hydrogen sulphide detector for the determination and control of H_2S concentrations is announced by the E. D. Bullard Co., San Francisco, Calif. This device records concentrations from samples drawn

THE FIELD

to a recording instrument from different parts of the plant. It may be regulated to give a continuous chart record, or may be used for a series of spot determinations. Suitable sound or light alarms may be installed to warn against concentrations above a set limit.

FLOURESCENT LAMP DIFFUSER UNITS

A new line of lighting units designed to utilize the lighting characteristics of the recently introduced "daylight" flourescent lamps has been placed on the market by the Benjamin Electric Mfg. Co., Des Plaines, Illinois. The low surface brightness of the lamps and practical absence of radiant heat permit location of lighting



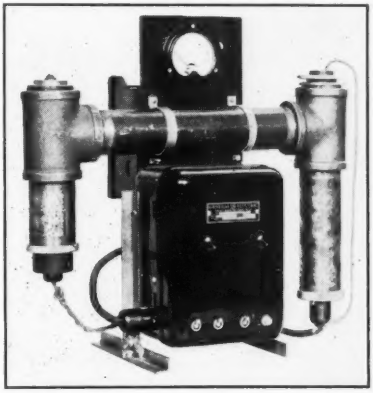
units low over the working plane, and even in the direct line of vision. Each unit is arranged for three lamps, and designed to increase lighting efficiency in commercial and industrial operations.

AIR BLAST OPERATOR'S HELMET

The Pangborn Corp., Hagerstown, Md., offers a new air blast operator's helmet, "DD-4". Features claimed for this new helmet are a fool-proof vision window; draftless flow of fresh air inside the hood; handy window screen; sure air line connections, easily detached; and softer, lighter shoulder padding. The helmet carries the seal of approval of the U. S. Bureau of Mines.

MERCURY FUME DETECTOR

Apparatus recently developed in the Research Laboratory of the General Electric Co., Schenectady, N.Y. is designed to detect and measure mercury vapor. Invisible



to the human eye, the mercury vapor is subject to the physical law that any vapor will absorb the same color of light that it emits when excited. Since Mercury's emitted light is blue and ultra-violet, and the new shadow detector uses a lamp giving these colors, when samples of the air being tested are

sucked into the unit the mercury vapor will absorb the light from the lamp and cast a shadow.

Though still too slight for perception by the human eye, this shadow is detected by the photoelectric tube upon which it is directed. The actual amount of mercury, which bears a relation to the amount of shadow cast, is measured by the apparatus. As little as one part of the mercury vapor to one billion parts of air casts the shadow distinctly.

The ultra-violet lamp and the phototube are mounted at opposite ends of a short length of 2-inch standard pipe through which the air or gas sample are drawn. An amplifier vacuum tube is mounted in the same housing as the phototube. The indicating meter measures the decrease in plate current of this amplifier from the condition of a pure gas sample, so that a current flowing in the meter signifies a reduction of the light and hence the presence of mercury vapor. A recording meter may easily be installed in place of the indicating meter. The device may be supplied with an alarm, and may be operated by remote control from a distance of several hundred feet. The detector requires about 100 watts to operate, and plugs into an ordinary a-c outlet.

RESPIRATORS FOR ORGANIC VAPORS AND FUMES

A new rubber constructed respirator for protection against injurious gases and fumes has been announced by the H. S. Cover Co., South Bend, Indiana. It is a twin filter type respirator equipped with twin cartridges of special charcoal for organic vapors, soda lime for acid gases and copper sulphate for ammonia gases. Cartridges are easily removable and quickly replaced by new ones.

Air filter apertures have been placed back at cheek location for distribution of weight. Exhalation valve is placed close to mouth for positive elimination of breathed air. Face piece is of soft rubber to make an air-tight fit. A face cloth is provided for comfort and as a safeguard against dermatitis.

PROPER PRODUCTION CHAIR

The Royal Metal Manufacturing Co., Chicago, Illinois offers a "production chair" designed to provide industrial workers with

the proper chair for most comfortable posture. The chair is metal, with wooden adjustable saddle seat, and wooden back rest. Front of seat is ½" higher than the rear. Backrest is detachable and adjustable.

FIREPROOF BLANKET

A fireproof blanket, manufactured of fireproofed, mothproofed wool, and mounted to be wrapped around one's body easily and quickly is announced by the Davis Emergency Equipment Co., New York. The

blanket is 80 inches in length, wound on a vertical roller which is mounted on a wall or post. The worker thrusts an arm through a catch-rope attached to the exposed edge of the blanket and wraps the blanket around him. The blanket is easily replaced on the roller and when mounted takes up very little room.

NEW VACUUM SWEEPER

"MultiSweep" is the name of a new vacuum sweeper announced by the Foote Company, Inc., Nunda, N.Y. It is a combination brush and full vacuum type of sweeper designed to keep large areas clean economically and easily. The "MultiSweep" is a self-propelled, compact unit, requiring only a single operator to guide it. Controls for operation are on the handlebars. Driving mechanism is fully enclosed; either gasoline or electric power may be used; and balloon tires are standard. Combined sweeping width is 36".

NEW DERMATITIS PREVENTION

Produced following extended laboratory research, "Liquid Ply #2," developed for prevention of skin irritations tracing to hydro-carbon solvents, chlorinated hydro-barbons and petroleum solvents, has been introduced by the Milburn Company of Detroit. This addition to the company's line of dermatoses preventives is said to have one of the largest fields of usefulness of any of the Ply products and in a field productive of a high percentage of industrial dermatoses cases.

ATTACKS ON BALANCE SHEETS

[*Continued from page 15*]

ceedingly dry or oily skins should be placed advantageously. The periodic physical examination of employees is in reality a check on the effectiveness of a control scheme. It will reveal whether prevention is being accomplished and will detect early cases of dermatosis among workers.

The actual methods of avoiding dermatoses due to irritating substances used in industry can be classed as personal protective devices such as protective ointments, gloves and aprons, or removal methods such as ventilated hoods and enclosed apparatus. Each process will require a study to determine the most economical method of avoiding dermatoses. The possible expense involved if cases do arise and the toxicity of the materials will determine the extent of the protective measures and the necessary efficiency of the scheme. It is important that the protective scheme worked out fall in line with the severity of the condition. For example, if many workers are involved where rather toxic materials are used, thousands of dollars can be spent if need be. Again if only one or two are involved and the hazard is slight, it would be unreasonable to expect that an elaborate ventilating system or an entire new design of equipment would be justified and a simpler protective scheme must be evolved.

The last but not least factor in the problem is the maintenance of protective equipment. In working out a protective scheme, factors must be added which will insure its continued operation after the designer turns it over to shop personnel for use. Protective equipment starts to deteriorate and become inefficient the minute it is instituted and if this progresses without maintenance it will very soon be so inefficient that cases of dermatitis will arise and the whole planning of the scheme will be upset. The graphs shown on page 14 give a schematic representation of the need for maintenance.

"As Maine Goes"—

Maine Makes Occupational Disease Survey

UNDER the authority of the State Legislature, the Bureau of Health of the State of Maine has just completed a survey of industrial plants and conditions in Maine looking forward to legislation for the control, prevention and compensation of occupational diseases. 393 plants and 65,790 workers (45,078 male and 20,712 female) in 16 industry and service groups were studied. This representative sample included 23 per cent of all the gainful workers in the State according to the Census figures of 1930.

Some interesting results of the survey are:

12.7% of employees have benefit of full-time safety director
41.4% of employees have benefit of part-time safety director
39.2% of employees have benefit of shop safety committees
32.7% of workers were exposed to organic dusts
12.3% of workers were exposed to petroleum products
9.7% of workers were exposed to metals and their compounds (other than lead and chromium)
8.3% of workers were exposed to oils, fats, waxes
5.5% of workers exposed to other dermatitis producers

Some of the more important materials to which workers were exposed and the percentage of workers who have some form of control measures available are as follows:

Organic Dusts
35.1% of workers exposed have controls
Lead and its compounds
21.8% of workers exposed have controls
Organic solvents
15.4% of workers exposed have controls
Other metals and their compounds
19.4% of workers exposed have controls
Dermatitis Producers
13.6% of workers exposed have controls

The committee making the survey concluded that there were many potential exposures to the health of the industrial population and that control measures should be adopted more generally.

Fumes Cause Explosion

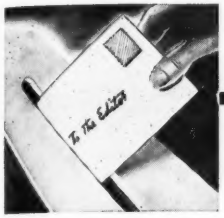
AN UNFORTUNATE accident which occurred on October 10 in an Ashtabula, Ohio, railroad shop emphasizes again the importance of thoroughly freeing containers from fumes before cleaning or welding operations are begun. In this case, a railroad tank car had contained gasoline. The workman began a welding operation before the fumes had been freed from the car. The resultant explosion severely injured the worker and caused marked property loss.

Rule Observance

A MACHINIST employed at the Youngstown Foundry and Machine Company suffered an injury to his hand where it was caught in a chain drag gear while putting a belt on a lathe pulley.

Investigation showed that the guard provided for the gear was sub-standard and that it was a common practice for operators to throw on belts while the machine was in motion.

Questions and Answers



Readers may obtain answers to industrial health or accident questions upon request to the editor. A few of such questions received each month are published for their general interest.

Paint Spray Booths

WHAT preventive measures and equipment are necessary for the protection of workers employed in the operation of paint spraying?

J. H. I.
Baltimore, Md.

Paint spray booths are used for the following reasons:

1. To protect the health of workmen.
2. To reduce fire explosion hazards.
3. To assist in securing smooth paint finishes.
4. To prevent dissemination of paint into adjoining machinery, over finished work, walls, etc.

Fundamentally, paint spray booths are protective devices and should be designed, constructed and operated as such. Quite often spray booths are required by law and it is suggested that you should consult your state requirements in order to determine this fact. However, the extent of the operations which you carry on should be the determining factor in the construction of paint spray booths in your plant.

The exhaust system from a paint spray booth should be sufficient to maintain an average and uniform velocity over the face of the booth of 150 ft. per minute. Baffles, or preferably, a water washer, should be used to separate the paint mist from the air before it is discharged. The discharge should be made outside the building unless adequate tests have been made to insure that all gases and mists are removed from the discharged air.

Spray booths and exhaust piping should be equipped with sprinkler heads and if necessary proper drains installed to take away water from the sprinkler heads.

The booths should be cleaned periodically; all storage of paints and thinners made outside the booth; and ventilated metal containers provided for rags and other waste material. Proxylin lacquer and varnishes, or oil paints should not be sprayed in the same booth, since spontaneous combustion of this mixture will take place. All electrical equipment must be suitably grounded, and vapor proof fixtures used inside of the booth and for extension lights. Motors of the non-sparking type should be used. All fan motors should be outside the ducts.

Finally, the spray booths must be of adequate size so that the largest piece to be sprayed can be placed entirely inside the booths.

Distillate Irritates Workers' Hands

Can you recommend any ingredients that might be blended with a No. 1 Distillate to overcome the irritating effects of the distillate on the operator's hands, and at the same time be as good a cleansing agent as the distillate?

G. R.
Minneapolis, Minn.

It is possible to secure commercially various ingredients which are designed to reduce and eliminate the possibility of skin irritations and infections arising from the use of cutting oils. The addition of disinfectants, germicides and similar ingredients in proper proportion to the distillate tend to destroy germs and bacteria which the distillate itself may not show traces of infectious bacteria, germs are present on the skin and the oil facilitates their penetrat-

ing the skin. Also, oils tend to clog the pores and give the bacteria and germs a chance to cause infection. The use of the disinfectants and germicides will not materially decrease the efficiency of the distillate.

It is suggested, also, that the irritating effects may be caused by foreign substances, sulphur and salts present in the distillate. The substitution of a standard stoddard solvent to overcome this problem may be advisable. Such solvents are manufactured commercially and have practically the same efficiency as a distillate for cleansing purposes.

Handling Glass Wool

We'd like to know what are the hazards in handling glass wool including possible silicosis as well as lacerations?

D. G. W.
Buffalo, N.Y.

Careful investigation of the possible silicosis in the handling of glass wool indicates that there is no silicosis hazard involved. Extensive tests and studies have been conducted both in the laboratory and field and results indicate that the inhalation of glass wool particles will not cause silicosis.

As far as the possibility of lacerations go, several manufacturers report that they have not experienced any injuries from such cause. However, it is suggested that workers handling glass wool take proper precautions in the protection of their hands and other exposed parts of the body.

Litharge Paste

Would you please tell us if there are any lead poisoning hazards involved in the use of litharge paste?

H. E. S.
Chicago, Illinois

Directly the possibility of skin absorption of lead in the handling of litharge paste is very remote. The hazards involved are indirect through the drying of the paste and the inhalation of the fumes. If the paste is allowed to dry on work benches or other places where it is handled, there is a lead fume hazard present. Or if the paste dries on clothing, it may also lead to an inhalation by the worker, thereby creating a possible source of lead poisoning. The preventive measures to be taken in the handling of litharge paste are primarily those of good housekeeping and personal cleanliness. All work areas should be kept clean, and all workers should bathe daily and keep their clothes free from the dried paste.

PAPER MILL FATALITY

[*Continued from page 30*]

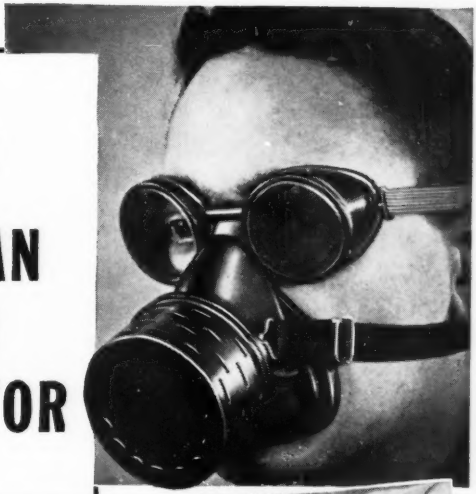
ber 8 when he fell from a housing enclosing the upper half of a revolving corrugated beater roll operating in a stock washer, and his right leg and a portion of his body was caught between the revolving roll and the floor of the washer.

The workman was cleaning up the washer after a producing operation. The washer was one of a series in a row, all connected up to and operated from one line shaft, operating in bearings attached to upper part of washers. There was no means of disengaging power from one washer while others in the line were under production. Also, it was the usual practice to clean the washers while beater roll was operating idly with no stock in it.

The roll and shaft of the steel washer are covered with a housing. The victim stepped or fell from this housing. While the housing covering was provided with a twelve-inch ledges or foot-walk as a safety precaution and to prevent stock flying out of the washer, it is presumed the worker slipped on the rounded covering of the housing and grasped an iron bar over the washer, which severed his body under the housing.

The absence of an individual disengaging device for each washer, necessitating cleaning operations while machinery is in motion, is contrary to ordinary safe practices.

New AMERICAN R 1000 RESPIRATOR



... Brings **AMERICAN OPTICAL** *Quality and Safety to the field of Respiratory Protection from Type A Dusts*

Take stock of the American R1000 Respirator: New compactness. Light weight. Unobstructed visibility. Efficient inhalation valve, an exclusive feature. Positive-acting exhalation valves. Special filter cartridge that, with reasonable care, will last as long as the respirator. Pliable rubber face mask has edges cantilevered to provide a dust-tight seal with comfort. And other plus-value features. *Approved by U. S. Bureau of Mines.*

WRITE FOR COMPLETE INFORMATION

EXHALATION VALVES
... one on each side, assure expulsion of exhaled air, even when worker's head is down. Can't stay open, fill with moisture, or freeze.

INHALATION VALVE
... minimizes re-breathing, keeps worker's efficiency at maximum. ALSO NOTE FILTER CARTRIDGE... *more compact, yet has 42 square inches of effective filter area.*

AMERICAN OPTICAL COMPANY

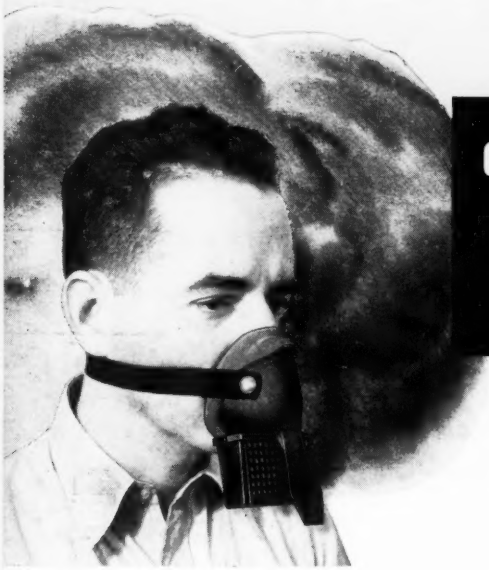
Manufacturers, for more than 100 years, of products to aid and protect vision. Factories at Southbridge, Mass. In Canada, Consolidated Optical Co., Ltd. Branch offices in all principal industrial centers

5329

THE

RESPIRATOR

APPROVED BY U. S. BUREAU OF MINES
(Approval No. 2115)



GENUINELY IMPROVED IN DESIGN AND COMFORT!

LIGHTWEIGHT—total weight complete, 3½ ounces

COMPACT—full vision in every direction, no interference with goggles or any head covering

LOW BREATHING RESISTANCE—has large filter, compactly folded.

EASY TO MAINTAIN—all parts, including rubber face-cushion easily replaceable; may be completely sterilized.

FOOLPROOF EXHALATION VALVE—U. S. Army Gas Mask-type—most positive, leak proof valve ever designed—provides drainage when necessary.

PROTECTIVE FILTER COVER—prevents contamination of filter by grease and dirt from hands and equipment.

These outstanding features are combined with U. S. Bureau of Mines-approved protection against silica and nuisance dusts, and easy day-long wearing comfort,—in smaller dimension than any other dust respirator on the market! Investigate the modern aluminum and rubber DUST-FOE. Write today for its complete story in Bulletin O-CM-2

1914—25 YEARS OF SAFETY PROGRESS—1939

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Braddock, Thomas and Meade Streets, Pittsburgh, Pa.

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M.S.A. Products include Breathing Apparatus . . . Inhalators . . . Comfo Respirators . . . Masks of all Types . . . Gas Indicators . . . Gas Detectors . . . Safety Goggles . . . Protective Hats and Caps . . . Edison Electric Cap Lamps . . . Safety Belts . . . Safety Clothing . . . First Aid Equipment. Descriptive Bulletins on request.